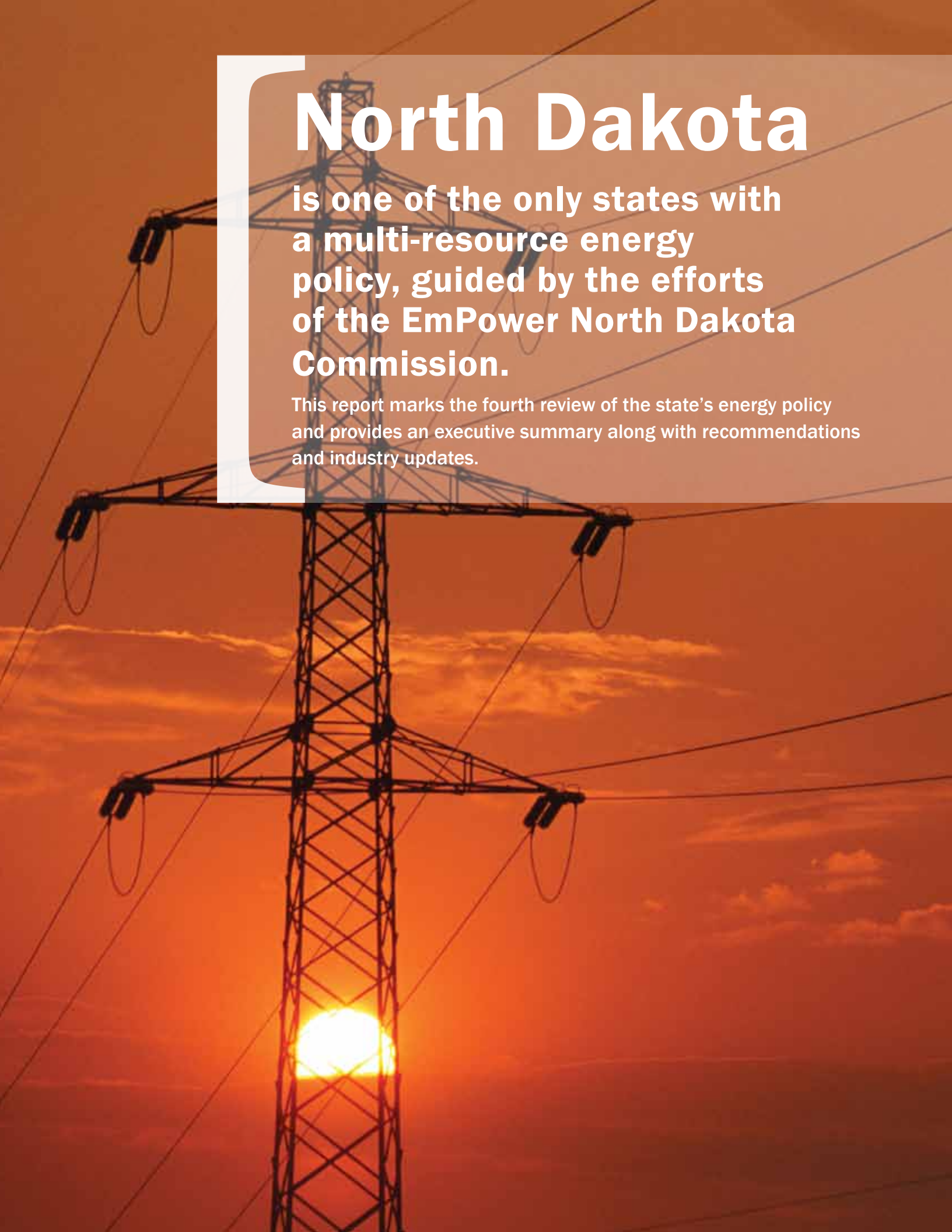
EMPOWER

North Dakota®

2014 Policy Updates and Recommendations



North Dakota

is one of the only states with a multi-resource energy policy, guided by the efforts of the EmPower North Dakota Commission.

This report marks the fourth review of the state's energy policy and provides an executive summary along with recommendations and industry updates.

EmPower North Dakota

2014 POLICY UPDATES AND RECOMMENDATIONS

North Dakota® DEPARTMENT OF COMMERCE

North Dakota

is the 2nd largest oil-producing state in the nation.

Executive Summary

Through the EmPower North Dakota Commission, leaders from all major energy industries in North Dakota meet regularly with one common goal: to be critical thinkers for the development of the state's energy resources.

The strategic partnerships between North Dakota's long-standing and emerging energy industries enable all sectors of the industry to work together as they meet our state's and country's energy needs without government mandates.

North Dakota is proactive and aggressive in addressing energy development and serves as a model for America in fostering innovative, long-term energy strategies to meet our nation's growing energy demand and need for energy security in an environmentally responsible manner.

The state's diverse energy landscape celebrates many successes:

- North Dakota is the second largest oil-producing state in the nation and would be the 20th largest producing country in the world with production of one million barrels per day as of April 2014. The industry has over 10,100 producing oil wells, employs 65,000 direct and indirect jobs, has a $30 billion economic impact, and contributes $11 million per day to the state and political subdivisions in oil production taxes.

- Utility companies produce 4,000 megawatts of lignite and other coal generation at seven locations providing low cost, reliable electric power to two million customers in North Dakota, South Dakota, Minnesota, Montana and Iowa. North Dakota is one of the country's top 10 coal-producing states, mining approximately 30 million tons every year since 1988, which results in an annual economic impact of $3 billion.

Executive Summary (continued)

- North Dakota leads the nation in the production of 10 different agricultural commodities including two commodities used for liquid fuels. Several additional crops provide feedstock for successful and developing bio-refining industries in North Dakota.

- Between 2007-2012 North Dakota increased its energy production by 179.7 percent.

- North Dakota has gone from 1.0 percent of the U.S. energy production to 2.7 percent and from being 23rd to 12th among U.S. states between 2007-2012.

- North Dakota continues to develop a thriving ethanol industry, which ranks 9th in the nation. It contributes more than $640 million annually to the economy and supports more than 10,000 direct and indirect jobs. The state has established itself as a national leader in flex fuel pump infrastructure and has seen a 50 percent increase in flex fuel vehicles over the past three years with 98,100 currently on the road.

- There are 22 natural gas processing plants operating in western North Dakota. The oil and gas industry is investing over $6 billion in infrastructure to capture natural gas, and four additional new or expanded plants are planned to come online by 2016. Natural gas gathering systems connected to 2,020 wells in 2013, up 113 percent from 949 wells in 2011.

- In 2013, North Dakota ranked 12th in the nation in installed wind energy capacity. The North Dakota Public Service Commission has permitted over 1,672 megawatts of wind generation.

- The state's only operating oil refinery has expanded to 70,000 barrels per day. In addition, a 20,000 barrels per day diesel topping refinery is under construction with an expected completion by December 2014. A number of other refineries are in various stages of planning and permitting.

Future Vision

North Dakota's future is one where many of the energy sectors have the potential to not only grow, but also develop new economies based on value-added opportunities related to energy resources. In order to move forward, the state needs to address several key areas crucial to the expansion of energy production and extraction. North Dakota needs to work with the industry to begin exploring ways to capture opportunities to develop raw resources into new products, including petrochemicals, plastics, nanofibers, manufactured products or materials yet to be discovered.

The EmPower North Dakota Commission has identified five critical components for continuing to grow energy production and new energy-related industries:

1. **Infrastructure** – Up-to-date infrastructure is the foundation for continuing existing development and expanding into new areas.

2. **Workforce** – As the energy industry expands, the workforce must be available to meet the demands.

3. **Research and Development** – Research and development serves as the bridge for industry to move from concepts to new development and commercialization.

4. **Regulatory Environment** – A regulatory environment, at both the federal and state levels, that encourages economic growth while ensuring environmentally-responsible development of natural resources is essential.

5. **Energy Growth Incentives** – New and continued incentives are needed to capitalize on development opportunities across North Dakota's energy sectors.

EmPower ND Commission Members

In 2007, the North Dakota Legislature formalized energy policy and created the 16-member EmPower Commission which includes representatives from across the energy industry. Their insights provide the substance for this updated EmPower North Dakota Comprehensive State Energy Policy.

Al Anderson
North Dakota Department of Commerce, chairman

Jason Bohrer
Lignite Energy Council, lignite coal

Mark Bring
Otter Tail Power Company, ex officio

Ron Day
Tesoro, refining or gas-processing

Terry Goerger
farmer, agriculture

Margaret Hodnik
Allete, Inc., ex officio

Eric Mack
Archer Daniels Midland, biodiesel

Ron Ness
North Dakota Petroleum Council, oil and gas

Dale Niezwaag
Basin Electric Power Cooperative, generation and transmission electric cooperatives

Mark Nisbet
Xcel Energy, wind

Mike Rud
North Dakota Petroleum Marketers Association, petroleum marketers

Randy Schneider
North Dakota Ethanol Producers Association, ethanol

Jay Skabo
Montana-Dakota Utilities Co., investor–owned utilities

David Straley
North American Coal Corporation, lignite coal producing industry

Sandi Tabor
KLJ, ex officio

John Weeda
Great River Energy, biomass

Julie Voeck
NextEra Energy Resources, LLC., ex officio

Commission Recommendations

INFRASTRUCTURE

Adequate infrastructure – such as water pipelines, roads, oil and natural gas pipelines, railroads, electric transmission lines, power generation and affordable housing – is key to the efficient and effective development of North Dakota's energy resources. While most current infrastructure needs are related to oil and gas development in western North Dakota, all energy sectors benefit from similar infrastructure support throughout the state. Infrastructure provides the backbone for North Dakota's energy industry to export products to the rest of the nation, and perhaps the world. In addition, this component is critical to the growth of communities, the minimization of development impacts, and enhanced public safety.

The 2013 Legislative Assembly made substantial progress towards meeting the critical infrastructure needs of the state with an investment of $2.5 billion in oil and gas impacted areas, nearly double the amount appropriated in 2011. However, continued growth of our energy industry and the state's economy are leading to infrastructure shortfalls and more must be done to assist communities in closing the gap.

The EmPower North Dakota Commission receives regular updates from the North Dakota Department of Commerce staff regarding continued western needs. Of the many concerns raised by local leaders, infrastructure issues were identified as critical to maintaining North Dakota's quality of life. In order to meet the growing demands of western North Dakota, the state needs to continue to make a long-term commitment of capital to address the acute infrastructure shortfalls related to the significant growth of oil and gas production, processing and transportation facilities.

Adequate infrastructure is key to the efficient and effective development of North Dakota's energy resources.

Transportation infrastructure development includes construction and upgrading of roads and bridges on state, county and township systems. In 2013, western North Dakota experienced a 25 percent increase in vehicle miles traveled. As oil and gas activities continue, as well as agricultural movement, this increased traffic will create greater need and frequency for repairs and replacement. The Upper Great Plains Transportation Institute's 2014 study

In 2013, western North Dakota experienced a 25 percent increase in vehicle miles traveled.

INFRASTRUCTURE (continued)

of county, township and tribal transportation infrastructure needs estimates the following state investment is needed for the 2015-2017 biennium:

- Unpaved roads - $548 million
- Paved roads - $377 million
- Bridges - $70 million

New methods to provide adequate funding to address these critical areas must be designed. Without a new approach, local governments and communities will continue to fall behind resulting in continued impact on development and quality of life. Concerns related to environmental issues like increased dust from trucks, proper storage of waste water, and others must also be addressed. Challenges also exist in the construction of necessary infrastructure as landowners become reluctant to grant easements on their property.

In light of the issues facing infrastructure related to energy development in the state, the Commission urges the State of North Dakota to:

- Support the passage of legislation within the first 30 days of the 2015 legislative session providing infrastructure funding to oil and gas impacted areas to ensure early availability of adequate funding to allow bidding processes to occur and result in timely use of the 2015 construction season.
- Support changes to the gross production tax distribution formula to provide additional funding to assist with local infrastructure needs.
- Support a transportation funding level that meets the needs identified by the Upper Great Plains Transportation Institute.
- Recommend the immediate creation of an authority focused on regional infrastructure (roads, airports, emergency and medical services, water and waste water, etc.) that will work with communities in coordinating strategic planning efforts in the hub cities of Dickinson, Minot and Williston, and primary Bakken counties of Dunn, McKenzie, Mountrail and Williams. These efforts should:
    - Provide periodic updates and evaluation on the progress of infrastructure development and future needs to the legislature in regards to state and community planning and investments.
    - Work in cooperation with the Energy Impact Coordinator to understand local issues and efforts.
    - Assist in data gathering and coordination of infrastructure funding, providing recommendations with input from local communities and distributing agencies.
- Create a trigger mechanism that will make additional funds available to oil impacted communities from the state share of the oil tax revenue when revenue exceeds certain thresholds.
- Support expansion of existing water systems to provide capacity to meet growing community and commercial needs.
- Support the State Water Commission's efforts to increase access to Lake Sakakawea water for community and commercial needs to alleviate pressure on other water sources, reduce local truck traffic and improve road safety.
- Monitor the railroad infrastructure upgrade plan within North Dakota to ensure there is adequate ability to the meet the export demand of all commodities to market.

WORKFORCE

North Dakota has one of the best business climates in the country fueling unprecedented growth, leading to a shortage of workers in virtually every industry and every corner of our state. As a result, securing skilled workforce to meet the needs of the state's business community is a high priority. As the state's demand for workers continues to grow, there needs to be greater focus on training and retaining our youth, as well as promoting opportunities to attract workers from outside the state.

The need to recruit and retain a permanent workforce is evident in the following statistics:

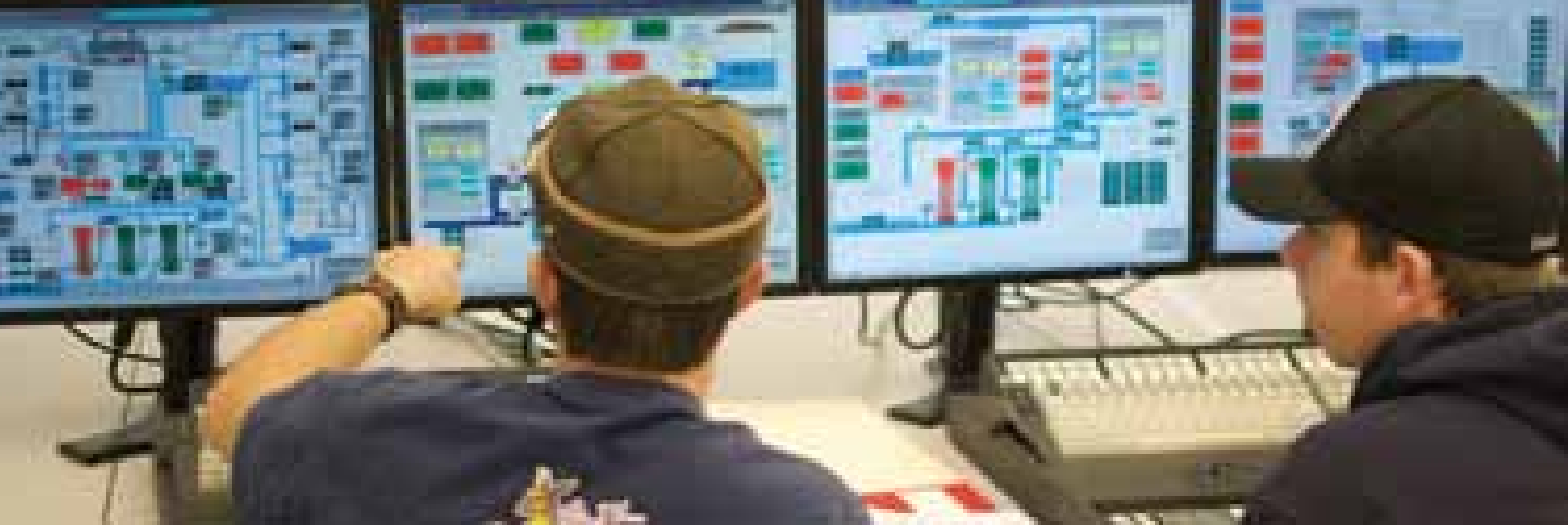
- 25,000 jobs are currently open across North Dakota.
- North Dakota is expected to add over 76,000 jobs between 2010 and 2020.
- Healthcare, construction, energy, manufacturing, transportation, public services, agriculture, tourism and retail all report significant workforce shortages.

The State's workforce needs are not just limited to the oil and gas industry.

- About 35 percent of all current job openings are energy related.
- About 85 percent of private jobs in the state are not oil and gas related.
- The Fargo area has the most job openings in the state, followed by Bismarck.

25,000 jobs are currently open across North Dakota. Over 60 percent of these exist outside the oil and gas counties.

As workforce needs continue to grow, the funding sources that support infrastructure and community development must be enhanced. Companies and private investors are working to address housing shortages throughout the state by providing crew camps, apartments, single- and multi-family homes. Single family housing is very important to attract the high-demand, high-skilled workforce the energy industry needs long-term. The state must continue to support the key infrastructure that supports the ease of development in many of our western communities.



WORKFORCE (continued)

Many of the state's new families also have unique financial needs. The Housing Incentive Fund, administered by the North Dakota Housing Finance Agency, is working to meet the need for affordable housing, but greater enhancements are necessary.

One of the challenges impacting the energy industry's ability to attract qualified employees is the lack of knowledge about the tremendous opportunities for young people in the energy industry. Many high-demand positions in several energy sectors rely heavily on skills in science, technology, engineering and mathematics (STEM). Incorporating STEM courses at an earlier age and educating career counselors and parents about high-demand careers will facilitate the long-term growth of the energy workforce talent pool. To improve the overall situation, the energy industry and research councils supported the development of curriculum for grades 4 and 8 which will be rolled out in Fall 2014. Discussions with officials at the Department of Public Instruction were initiated to understand how best to develop high school curriculum. These efforts are on-going. Curriculum development, however, is only part of the puzzle. Energy representatives also met with representatives from Valley City State University to discuss STEM education initiatives and the opportunity for energy curriculum development to train students pursuing teaching degrees. While great strides have been made in curriculum development, the needs for securing a stable funding source for curriculum maintenance and continued development is critical.

The current workforce landscape has many vocational or technical degree openings that can provide well paying, life-long careers (i.e., welders, lineman, electricians, boilermakers and mechanics). Many of the current energy-related workforce needs could be filled by individuals with vocational or technical skills.

Industry and education groups need to continue to work together to bring awareness to career and specialized training opportunities in North Dakota. The State of North Dakota and the energy industry must continue to strengthen existing partnerships to educate students of all ages about the wide variety of vocational and technical degree openings. Focus on this effort has proven successful; for example, at the recently expanded diesel mechanic program at North Dakota State School of Science in Wahpeton, most graduates leave with a North Dakota-based position in-hand as the school partners with business to meet critical workforce needs. The development of more training programs focused on meeting growing workforce requirements will need continued support by the legislature, EmPower North Dakota Commission and others. Adequate funding must be available for these important educational programs that support energy-related careers.

Also supporting the industry is TrainND, which provides customized training programs such as CDL and safety training, and employee development initiatives across the state. These training programs give North Dakota businesses an edge to better

WORKFORCE (continued)

compete on a local, national and international level. Continued support for programs such as TrainND and Operation Intern, which match youth with businesses while supporting long-term workforce growth in North Dakota, are critical.

In an effort to assist with workforce demand, the North Dakota Economic Development Foundation has launched the Find the Good Life in North Dakota campaign, a workforce recruitment effort. It is a private/public sector funded program designed to help solve the greatest challenge facing our business community: workforce development, recruitment and retention. The fundraising goal of $2.5 million will fund a comprehensive two-year campaign focused on increasing workforce within North Dakota and securing out-of-state workers and students to fill high-demand careers. The campaign works with North Dakota companies and industry organizations to promote jobs through strategies such as out-of-state job fairs, veteran recruitment and other efforts.

The energy industry looks to the Governor's Workforce Development Council and Job Service North Dakota to better identify energy workforce needs and how North Dakota can maximize resources to meet those needs into the future. These efforts will ensure that Governor Dalrymple and the legislature receive the information necessary to sustain the long-term growth of the energy sector in North Dakota.

In light of the issues facing workforce related to energy development in the state, the Commission urges the State of North Dakota to:

- Continue support of the Housing Incentive Fund to the level suggested by the North Dakota Housing Finance Agency to meet market conditions, and consider a trigger on an annual basis for additional funds.
- Increase efforts to educate North Dakota's youth about the state's natural resources by funding the development, implementation and sustainability of curriculum at the elementary and high-school level to encourage interest in energy careers through the North Dakota Department of Public Instruction.
- Encourage and enable the energy industry to collaborate with the North Dakota University System, Governor's Workforce Development Council, Job Service North Dakota and other agencies to:
    - Encourage industry interaction with teachers and guidance counselors to grow youth knowledge and interest in energy careers and to better retain youth for high-demand career options.
    - Provide greater accessibility to career and technical education programs, especially through adequate training facilities. Career examples include, but are not limited to:
        - Science, technology, engineering, and mathematics (STEM) education
        - Industrial equipment supplier supported programs
        - Commercial driver's license (CDL) training sites
        - Emergency medical services
        - Technical trades/internships
        - Energy careers
        - Workforce safety careers
- Support increased funding for workplace safety and training. Examples of efforts include:
    - Training workforce safety professionals
    - New-hire training
    - Back-to-work efforts
- Support legislation which recognizes the role distance learning will play in the future of education and improve access to technology for students using distance learning programs.

RESEARCH AND DEVELOPMENT

A key component to assuring the use of our valuable natural resources now and into the future is research and development (R&D). The state has been a leader in fostering R&D partnerships between private industry, higher education and research facilities. As R&D funding is reduced at the federal level, the state's role along with its partners is even more critical in finding ways to utilize North Dakota's vast energy resources. Through existing R&D programs, the state has the potential to allow R&D to undertake a new role in understanding the synergies between renewable and traditional energy resources.

For traditional fuels like lignite, oil and natural gas, R&D provides a road map for the development of new technologies that will provide fewer emissions and cleaner energy in the exploration stage or in the energy conversion process. For instance, lignite R&D projects are examining new ways to lower mercury, nitrogen oxide and sulfur dioxide emissions. The lignite R&D is focused on preserving the existing fleet of lignite based plants by developing new options for control of criteria pollutants such as NOx, metals like mercury and CO_2 capture and sequestration. In addition, new technologies for options to produce low cost energy based on lignite that can meet the environmental challenges under today's regulatory climate are under development. Approximately $8 million is available each biennium to fund the lignite R&D program. The funding is derived from two cents per ton R&D tax, a dedicated percentage of the Coal Trust Fund and for a limited time a portion of the coal conversion tax. A portion of this funding is also used by the North Dakota Transmission Authority to work on transmission issues which can limit energy development opportunities in the state.

Through existing R&D programs, the state has the potential to allow R&D to undertake a new role in ensuring the future prosperity of North Dakota's vast energy resources.

The potential opportunities for secondary oil and gas recovery in North Dakota are in the very early stages of development. The importance of pursuing these opportunities is demonstrated by what is currently being done at the Dakota Gasification Company's plant in Beulah where CO_2 is captured and delivered by pipeline to the Weyburn oil field in Saskatchewan, Canada. It is estimated that the CO_2 being injected will extend that field's productive life for 25 years and result in production of as much as 130 million barrels

RESEARCH AND DEVELOPMENT (continued)

of oil that might otherwise have been abandoned. More research and technology development needs to occur to better understand how CO_2 injection or other methods of enhanced oil recovery can be applied in North Dakota's oil shale play.

The phenomenal growth over the past few years in oil and gas production is primarily due to the utilization of new technologies and practices. Research and development is needed to foster enhanced oil recovery in the Bakken and Three Forks Formations as well as other legacy formations. Other potential formations are currently being studied and wait for that "key" to unlock these natural resources for production. Through the Bakken Optimization Program, the oil and gas R&D program – in partnership with industry, the Energy and Environmental Research Center and higher education – is looking for the best methods to capture the oil and gas resources that remain underground and to do it with minimum impact to the land. This program includes research on waste minimization and utilization, spill remediation and land reclamation. Funding for the oil and gas R&D program is appropriated indirectly from the oil and gas production taxes at $10 million per biennium. A portion of this funding is used to provide staff for the Pipeline Authority and to carry on the Authority's work on oil and gas transportation issues.

The renewable R&D program is funded at $3 million per biennium from the state's Resources Trust Fund. This program promotes the growth of North Dakota's renewable energy industries through research, development, marketing and education. Funded projects have included the development of new renewable feedstocks, as well as technologies to process renewable energy.

As all our energy resources are developed, these research programs can play a critical role in advancing value-added processing and manufacturing across the state. The IHS study commissioned by the legislature is one step in that process. Now the work must continue in identifying the specific opportunities that the state can partner with the private sector to continue to grow the state's economy for years to come. Similar to the tremendous growth witnessed in value-added agriculture, North Dakota can become a leader in value-added manufacturing related to energy development.

Similar to the tremendous growth witnessed in value-added agriculture, North Dakota can become a leader in value-added manufacturing related to oil and gas development.

In light of the issues and opportunities needing research and development related to energy resources, the Commission urges the State of North Dakota to:

- Continue to support existing R&D programs to ensure the development and implementation of new technologies and promote new growth for all energy resources. Consider increasing the funding level for lignite research and oil and gas research programs.
- Support the additional appropriation of research dollars to be used by the lignite and oil and gas research councils to support R&D activities to resolve the technical problems associated with the commercial deployment of carbon capture technologies, seek additional incremental improvements in the recovery of oil through enhanced oil recovery using CO_2 or other gases, and develop and fund a FEED study to identify commercial opportunities associated with the beneficial capture and use of CO_2 as well as the need to meet the region's growing energy demand.
- Create and implement a strategy to assist North Dakota in developing viable petro- and bio-chemical industries.

REGULATORY ENVIRONMENT

Current EmPower North Dakota Commission goals and policy statements reflect concerns regarding the existing federal regulatory climate that often fails to provide for reasonable, responsible and cost-effective regulations over many facets of the energy industry. The Commission's goals and policies can be summarized as stated below:

The federal government should provide a fair and responsible regulatory environment based on sound science and the capacity of current technology to ensure future energy development. Federal regulations must be cost-effective and include sufficient lead time for industry to adapt to new statutory requirements affecting production or products. Federal regulations must be structured in ways to minimize placing new barriers on investment and development.

The current federal regulatory environment incorporates a "one-size-fits-all" policy that fails to take into account the unique nature of each state. North Dakota should encourage federal agencies to recognize unique environmental issues and to work with the state to develop regulations that are flexible, sensible and allow for state agencies to have primacy in the program.

Understanding the economic impact of federal regulations on the state's economy is also important. The energy industry can serve as a valuable ally in helping the state identify and analyze the impact of federal regulations on the citizens of North Dakota, as well as the energy industry. Simply understanding the impact of federal regulations, however, is only one part of the equation. Providing input to federal regulators on particularly onerous proposed regulations is a crucial part of the overall strategy to protect the state's interest. Equally important are communications with the North Dakota congressional delegation on federal regulations of importance to the state.

North Dakota must also recognize both the growth of all energy sectors and the additional burdens new regulations place on state regulatory agencies. Appropriate regulatory programs are a necessary part of ensuring that North Dakota can maintain its clean environment in conjunction with a healthy business environment. Staff and resources for state regulatory agencies need to expand to manage federal regulatory requirements and to ensure North Dakota retains primacy over these regulatory programs.

REGULATORY ENVIRONMENT (continued)

In light of the issues facing federal regulatory assessment related to energy development in the state, the Commission urges the State of North Dakota to:

- Encourage federal agencies to recognize environmental issues unique to North Dakota and work with state agencies to develop regulations that are flexible, sensible and allow for state primacy.
    - Encourage state agencies to provide regular updates on energy-related issues to the Commission and identify ways in which the Commission can support agency efforts on federal issues.
    - Establish new venues for state and federal regulatory agencies to collaborate on federal rulemaking efforts in ways that address individual state issues.
- Use the EmPower North Dakota Commission to better understand the economic impact of federal regulatory proposals on North Dakota.
    - Comment on proposed federal regulations with significant potential impact on the state's economy and engage the North Dakota Congressional delegation to actively challenge the implementation of final regulations posing a threat to North Dakota's economy.
- Recognize the additional burdens new energy development and regulations are placing on state regulatory agencies and provide adequate funding and staffing levels for the North Dakota Department of Health, North Dakota Department of Mineral Resources, North Dakota Public Service Commission, and North Dakota State Water Commission to ensure that each will be able to properly manage their respective programs.
    - Support legislative solutions which allow state agencies to design competitive compensation and benefit packages in order to attract and retain experienced employees in the disciplines related to energy development.
- Encourage the State of North Dakota to identify North Dakota-based solutions to manage waste generated from energy production.

ENERGY GROWTH INCENTIVES

North Dakota's energy industry growth has been phenomenal. While overall production of various forms of energy is at an all-time high, the state is on the brink of moving to the next level of production – adding value to each of our energy resources. The first steps in this journey were realized with the natural gas and ethanol value-added studies conducted during the present biennium. The EmPower North Dakota Commission guided these studies and supports the recommendations of each. These studies, however, reflect just the beginning of a number of initiatives lead by various energy sectors focused on discovering new ways to bring value to existing and new resources.

As the State and industry teamed together in these efforts, a key component that should not be lost is maintaining North Dakota's business friendly environment. While new initiatives will mean hundreds of millions of dollars of new investment in North Dakota, industry has always been able to rely on the State's willingness to offset a portion of the initial investment through tax incentives.

In light of the opportunities related to the next phase of energy development, the Commission urges the State of North Dakota to:

- Support incentives to expand value-added energy opportunities.
    - Provide a sales tax exemption for value-added energy facilities including both equipment and building materials, similar to the existing incentive for value-added agriculture.
- Support incentivizing or enhancing CO_2 capture, storage and enhanced oil recovery opportunities.
- Support an extraction tax credit on oil extraction for the development of technologies for beneficial use of drill cuttings.
- Support incentivizing or enhancing remote natural gas capture technology to minimize flaring.
- Support incentives to expand natural gas or liquid natural gas markets.
- Ensure tax certainty for wind to encourage future investment in renewable wind resources, recognizing the strategic role wind will play in continuing to enhance North Dakota's diverse energy portfolio.
- Support incentivizing the co-location of energy-related infrastructure in the same right-of-way.
- Support removing the beneficiation tax for coal conversion facilities that are subject to coal conversion tax.
- Support removing the sunset on the severance tax exemption for beneficiated coal used in agricultural commodity processing facilities.
- Remove the sunset on the sales tax exemption for beneficiated coal when used in agricultural processing facilities.
- Support a sales tax exemption for oil gathering lines.

Energy Sector Updates

BIODIESEL	North Dakota biodiesel production uses about 65 percent of the state's canola production, or about 700,000 acres worth of canola.
BIOMASS	Researchers at North Dakota State University continue the development of hybridized biomass in pellet form for use in manufacturing processes. Biocomposite pellets could replace up to 40 percent of petroleum-based plastics used in manufacturing.
ENERGY EFFICIENCY	Energy conservation efforts helped weatherize over 4,000 homes for low-income individuals across North Dakota.
ETHANOL	The ethanol industry contributes more than $640 million annually to the state's economy and supports more than 10,000 jobs.
LIGNITE	North Dakota's lignite industry generates 4,000 megawatts of electricity to 2 million customers and an economic impact of over $3 billion.
NATURAL GAS	The oil and gas industry is investing over $6 billion in infrastructure to capture natural gas, and four additional new or expanded plants are planned to come online by 2016.
OIL	North Dakota's oil industry generates more than $30 billion of economic activity and supports 35,000 direct workers and more than 65,000 indirect jobs across all sectors of the economy.
PETROLEUM MARKETING	Over 500 million gallons of diesel fuel are being used annually in oil activity, in comparison to annual consumption across the state of 1 billion gallons.
REFINING	In addition to Tesoro Mandan Refinery, North Dakota's second refinery – Dakota Prairie Refinery, LLC – is scheduled for start-up in December 2014.
SOLAR, GEOTHERMAL, HYDROGEN & HYDRO POWER	The Garrison Dam on the Missouri River, with a capacity of 583 megawatts, is North Dakota's 5th largest plant in electricity generation capacity.
TRANSMISSION	Basin Electric Power Cooperative, Inc. received approval from the North Dakota Public Service Commission for their 200-mile 345 kV line from the Antelope Valley Station to a substation located near Tioga.
WIND	Since 2012, the North Dakota Public Service Commission has approved wind projects with total investments estimated at $1.33 billion.

BIODIESEL

Biodiesel is a clean burning alternative fuel produced from renewable domestic resources that can help narrow the energy supply and demand gap. In North Dakota, biodiesel is primarily produced from canola oil feedstock, but can be made from any vegetable oil as well as from animal fats or used frying oils from restaurants and/or food manufacturing plants. The biodiesel industry is still in the defining stages of development in the United States. The volatile U.S. Biodiesel Blenders Credit has made it difficult for smaller plants to stay in business over the past few years. Currently, there is one biodiesel production facility operating in North Dakota, ADM Velva. Limited demand for biodiesel from within the state of North Dakota will limit the possibility of any new production plants in the state.

Highlights include:

- North Dakota biodiesel production uses about 65 percent of the state's canola production, or about 700,000 acres worth of canola.

- Each bushel of canola can produce 2.9 gallons of biodiesel.
- The ADM Velva plant brings jobs and new tax base into the area.
- The North Dakota State Research Center in Minot has been operating a field plot tractor fueled by B100 canola biodiesel for ten years with no mechanical issues.
- Since the canola biodiesel plant was built, North Dakota canola farmers have enjoyed historically high canola seed prices.
- State funding through the Centers of Excellence initiative has fostered a partnership between North Dakota State University and Monsanto to increase acreage and oil content of canola. The release of this new canola line in the near future will expand acreage and yields, increasing the available feedstock for biodiesel production in North Dakota.
- Investments in the Renewable Energy Development Fund have enabled the Energy and Environmental Research Center to develop a bio-based diesel with traits identical to petroleum-based diesel. The Biofuels PACE Program remains available as a financing incentive for new biofuel production facilities in North Dakota.

Each bushel of canola can produce 2.9 gallons of biodiesel.

BIOMASS

North Dakota's biomass industry has potential for significant contribution to the state's economy as it evolves. Both North Dakota State University and the Energy & Environmental Research Center, University of North Dakota, have numerous projects underway for biomass utilization. These projects include a wide variety of uses from gasification technology to nanofibers. In addition, there are industry efforts underway to use crop residues and wood waste for ethanol or other energy applications. Commercial application is yet to be achieved as the state works to grow support for biomass as a viable industry in North Dakota.

Highlights include:

- Research sponsors and North Dakota State University continue to work actively toward finalizing a business plan and developing the first energy beet to ethanol commercial installation. Energy beet field trials are being conducted at five regional locations across North Dakota in an effort to study productivity and sustainability. Beet and juice storage studies are also being conducted.
- North Dakota State University has also developed the biomaterials used in the "bio-boom," a hybrid of 20 to 30 percent renewable biomaterials, flax fiber and fiberglass used in a crop sprayer manufactured by AGCO Corporation.
- Midwest AgEnergy is constructing Dakota Spirit AgEnergy at Spiritwood, with the intent of producing 65 million gallons per year of ethanol. Once the backbone conventional ethanol facility is in operation, potential use of biomass at the facility will be evaluated again.
- North Dakota State University researchers are collaborating with several companies, including Composite Innovations Centre in Winnipeg, Manitoba. The research studies renewable biomaterials – canola, soybeans, flax and more – in combination with petroleum-based polymers and plastics for an array of products.
- Researchers at North Dakota State University continue to research the development of hybridized biomass in pellet form for use in manufacturing processes. Biocomposite pellets could replace up to 40 percent of petroleum-based plastics used in manufacturing.

ENERGY EFFICIENCY

Energy efficiency continues to be a high priority in homes and public buildings around the state. Over 11,000 energy efficiency and renewable energy rebates were given out to North Dakota residents and businesses resulting in $3.4 million in energy cost savings.

Highlights include:

- The 2013 Legislature provided for a transfer of one-half of one percent in the oil extraction tax deposited in the Resources Trust Fund to the energy conservation fund for public buildings, not to exceed $1.2 million per biennium.
- Using State Energy Plan funding, the North Dakota State University (NDSU) Agricultural and Biosystems Engineering Department and NDSU Extension Service provided education and technical assistance on energy efficiency and conservation through programs such as Home Energy 101, home builders educational seminars, 4-H leader training on the importance of home energy, and energy savings opportunities related to grain drying.
- Energy conservation efforts helped weatherize over 4,000 homes for low-income individuals across North Dakota.
- North Dakotans' received 3,800 rebates (at $150 each) for ENERGY STAR refrigerators, saving approximately 2 million kilowatt hours annually.

Over $900,000 annually will be saved from the implementation of energy savings measures in 19 North Dakota state facilities such as the State Capitol, North Dakota State School of Science and University of North Dakota.

- Approximately 197 local government buildings in 120 communities have been retrofitted through the Energy Efficiency and Conservation Block Grant (made possible with ARRA funding), annually saving over $1.1 million.
- Over $900,000 annually will be saved from the implementation of energy savings measures in 19 North Dakota state facilities such as the State Capitol, North Dakota State School of Science and University of North Dakota.
- The state building code now encompasses the 2009 International Energy Conservation Code and the International Residential Code energy efficiency requirements.

ETHANOL

The ethanol industry contributes more than $640 million annually to the state's economy and supports more than 10,000 jobs. North Dakota's ethanol plants employ nearly 200 workers directly in positions such as chemists, engineers, accountants, managers and support staff. The average annual wage for an ethanol plant employee in North Dakota is approximately $64,000.

Highlights include:

- North Dakota ranks 9th in the nation for ethanol production.
- North Dakota's ethanol industry has the capacity to produce:
  - 400 million gallons of ethanol, more than 10 times the amount produced in 2005.
  - 1.3 million tons of dry distillers grains, a high-value livestock feed.
  - 6 million gallons of corn oil, used in the biodiesel industry.
- Each North Dakota ethanol plant is located in a community with a population of less than 2,500 and contributes an average of 49 jobs and an average annual payroll of $3.3 million to the community.
- Approximately nine percent of the 400 million gallons of ethanol produced annually in North Dakota is blended with gasoline and sold within the state.
- North Dakota ethanol plants use approximately 140 million bushels of corn annually with more than 80 percent of the corn purchased from North Dakota farmers.
- North Dakota is a national leader in the establishment of flex fuel pumps and was the ninth state to offer E15. There are also 98,100 flex fuel vehicles (FFV), more than a 50 percent increase since 2011.
- Ethanol is blended with nearly 85 percent of the taxable fuel sold in North Dakota, which is a nearly 30 percent increase from 2012.
- The ethanol industry partnered with the state's corn growers and the Renewable Energy Program to implement a two-year ethanol marketing campaign. Over the life of the campaign, there was a 36 percent increase in statewide ethanol sales from 2010 to 2013.
- A bio-refinery is under construction near Jamestown. It is a 65-million gallon per year conventional dry mill ethanol plant and is projected to be completed in the spring of 2015.
- North Dakota's ethanol industry is reviewing the results of the Study to Evaluate Value-Added Market Opportunities for Ethanol Produced in North Dakota conducted by IHS Chemical and considering future opportunities.

LIGNITE

North Dakota's lignite industry is a vital part of the state's economy with an economic impact of more than $3 billion. The state supports 4,000 megawatts of lignite and other coal generation at seven locations providing low cost, reliable and clean electric power to two million customers in North Dakota, South Dakota, Minnesota, Montana and Iowa. North Dakota is one of the country's top 10 coal-producing states, mining approximately 30 million tons every year since 1988.

Nearly 80 percent of the lignite coal mined annually is used to generate electricity. About 13 percent is used to make synthetic natural gas that is delivered to 400,000 homes and businesses in the eastern United States, and seven percent is used to produce fertilizer products containing anhydrous ammonia and ammonium sulfate.

Highlights include:

- The 99 megawatts Spiritwood Station near Jamestown was commissioned in 2011. The plant is currently awaiting completion of the adjacent steam host to allow the plant to generate with the economics of a combined heat and power plant as designed.
- The Great Plains Synfuels Plant (Synfuels Plant), owned by Dakota Gasification Company (Dakota Gas), is the only commercial-scale coal gasification plant in the U.S. manufacturing natural gas. Average daily production of natural gas is about 153 million cubic feet, the majority of which is used in the eastern United States.
- The Synfuels Plant supplies carbon dioxide to the world's largest carbon capture and storage project in the world in Saskatchewan, Canada, for use in enhanced oil recovery. Dakota Gas currently captures between 2.5 and 3 million metric tons of CO_2 per year.
- Dakota Gas exports about 152 million cubic feet per day of CO_2 to Canada – about 50 percent of the CO_2 produced when running at full rates. As of 2013, Dakota Gas has captured almost 25 million metric tons of CO_2.
- Through 2013, more than 27,000 acres of mined land in North Dakota have gone through final bond release, equivalent to over 42 square miles.
    - A portion of reclaimed land has been devoted to public use such as Harmony Lake and Coal Lake which can now be used for hunting, fishing, photography, birding, canoeing, boating and other outdoor activities.
    - Basin Electric Power Cooperative's Glenharold mine received its final bond release in 2012. Over its 30 year productive life the mine won three national awards for its reclamation work.
- As of 2014, the Lignite Research Council is participating in 20 research and development projects worth over $180 million. Many of these projects focus on ways to reduce, capture and store CO_2.

Nearly 80 percent of the lignite coal mined annually is used to generate electricity.

NATURAL GAS

North Dakota produced 347 billion cubic feet of natural gas, processed 233 billion cubic feet of natural gas and paid $22 million in production taxes in 2013. Natural gas gathered and captured in North Dakota heats over 4.8 million homes in the U.S. Over the past two years, North Dakota's natural gas industry has worked hard to connect more than 3,800 new wells to gas plants.

There are 22 natural gas processing plants operating in western North Dakota. The oil and gas industry is investing over $6 billion in infrastructure to capture natural gas, and four additional new or expanded plants are planned to come online by 2016. These plants will add more than 400 million cubic feet of gas processing capacity and create hundreds of high-paying jobs in rural communities.

Highlights include:

- Natural gas gathering systems were connected to 2,020 wells in 2013. This is up 113 percent from 949 wells connected in 2011.
- The North Dakota Industrial Commission, through the Oil and Gas Research Program in partnership with private parties, has invested more than $10 million in research for new technologies to produce, capture and use natural gas at well sites. The results are intended to encourage and promote the use of new technologies that have a positive economic and environmental impact on oil and gas exploration. Examples include:
    - A $450,000 grant awarded to the Energy & Environmental Research Center to use for enhanced recovery of oil and natural gas in North Dakota.
    - An $8 million grant awarded to the Energy & Environmental Research Center to use for optimizing oil and natural gas production in North Dakota.
    - An $873,300 grant awarded to Bakken Express, LLC to use toward a $3 million natural gas capture initiative.
    - A $750,000 grant awarded to Energy & Environmental Research Center to use toward a $1.9 million natural gas capture initiative.
    - A $375,000 grant awarded to Blaise Energy, Inc. to use toward a $7.475 million natural gas capture initiative.
- Natural gas liquids present many opportunities for value-added energy. A study on value-added opportunities relating to natural gas liquids and ethanol was commissioned by the North Dakota Department of Commerce and was published in May 2014.
- As of 2012, North Dakota is the 14th largest natural gas producing state.

OIL

North Dakota's oil industry generates more than $30 billion of economic activity and supports 35,000 direct workers and more than 65,000 indirect jobs across all sectors of the economy. The necessary job skills continue to broaden as industry moves from the exploration phase towards the development phase.

As more new wells begin producing, more technical, permanent jobs will result. The average annual wage for an oil industry employee in North Dakota in 2012 was approximately $97,841, which is 118 percent above the statewide average wage of $44,914.

Highlights include:

- North Dakota is the second largest oil-producing state in the nation and would be the 20th largest producing country in the world.
- In April 2014, there were over 10,100 oil wells producing 1 million barrels of oil per day.
- Oil production taxes in 2013 exceeded $2.9 billion. Monthly oil tax collections exceeded $300 million in March 2014.
- Oil and gas production taxes accounted for 50 percent of North Dakota's total revenue collections in 2013.
- At $100 and 1 million BOPD, the industry contributes $11 million per day to the state and political subs (from the two oil taxes). Of this, $1 million per day goes to the counties/cities/schools/townships.
- In May 2014, North Dakota's Legacy Fund, which receives 30 percent of the oil tax revenue, has a balance of more than $2 billion dollars.

PETROLEUM MARKETING

North Dakota petroleum marketers are dedicated to providing quality product, great customer service and continue to be strong community leaders and supporters. Consumer demand always has and always will dictate what a petroleum retailer offers its customers.

The unprecedented economic growth in the state has been very good for the retail petroleum industry. One of the major challenges amidst all the prosperity has been finding adequate supplies of diesel, gas and even propane, particularly during peak demand seasons for the industrial and agricultural sectors. Workforce availability remains a major concern in the retail service arena with strong, high paying jobs developing across the state in all sectors of the economy.

Highlights include:

- There are roughly 500 petroleum marketers in North Dakota. There are also about 750 convenience stores/truck stops across the state. This number has grown significantly in the past few years as the state's economy continues to prosper and expand. These operations deal in every aspect of refined petroleum and renewable fuel products ranging from wholesale and supply to the numerous retail outlets scattered across the state.
- From April 2013 to April 2014, retail petroleum dealers sold about 500 million gallons of taxable gasoline in the state as well as close to one billion gallons of taxable diesel fuel. This figure does not take into account the roughly 900 million gallons of diesel fuel sold for non-highway use vital to agricultural, industrial and energy sectors within the state. Over 500 million gallons of diesel fuel are being used annually in oil activity alone.
- North Dakota petroleum marketers continue to support research and development of renewable fuels as viable sources of alternate energy.
- North Dakota gas retailers have been among the nation's leaders in promoting the sale of renewable fuels. North Dakota installed more than 220 flex fuel pumps, but as of December 2013 study that number has decreased to about 100 due to a number of factors. The North Dakota petroleum retailers and ethanol industry continue to work together to address these issues.

REFINING

North Dakota's refining capacity continues to expand with the continued growth of the Bakken Oil production. Several new refinery projects are being evaluated statewide.

Highlights include:

- North Dakota currently has one refinery in operation, Tesoro Mandan Refinery, with a crude operating capacity of 70,000 barrels per day.
- A second facility, Dakota Prairie Refinery, LLC, is under construction and is scheduled for start-up in December 2014. The Dakota Prairie Refinery will have a crude capacity of 20,000 barrel per day and will produce 7,000 to 10,000 barrels per day of diesel and other byproducts. It is the first refinery built in the U.S. since 1976.
- Several other diesel topping plants and refinery projects are currently being evaluated. These projects include a 20,000 barrel per day diesel topping plant near Trenton (Dakota Oil Processing) and a 15,000 barrel per day refinery near Makoti [Mandan, Hidatsa, and Arikara (MHA) Nation]. These projects are in various planning stages.

The Dakota Prairie refinery is the first refinery built in the U.S. since 1976.

SOLAR, GEOTHERMAL, HYDROGEN & HYDRO POWER

North Dakota has invested in research for hydrogen, solar and geothermal applications. This includes $2.5 million for a Centers of Excellence project at the Energy & Environmental Research Center's National Center for Hydrogen Technology, which is attracting hydrogen-based business to the state; funding for research at University of North Dakota for commercial application of geothermal; and funding for solar energy research at North Dakota State University.

Highlights include:

- Several electric cooperatives offer a program to help ranchers install solar powered stock pond watering pumps in rural areas where it is uneconomical to construct electric transmission lines. As an example, Verendrye Electric Cooperative has provided support for over 300 solar pumps and avoided building about 300 miles of distribution line at a savings of about $30,000 per mile.
- Whiting Oil uses solar PV systems at oil well sites to power pump jacks in isolated areas in which electrical services is not available.
- The Geothermal Laboratory at the University of North Dakota is conducting a geothermal power demonstration project in North Dakota in collaboration with the U.S. Department of Energy, Continental Resources, Inc., Slope Electric Cooperative and Access Energy, LLC. Start-up is scheduled for Summer 2014. The objective of the project is to demonstrate and test the technical and economic feasibility of generating electricity from non-conventional, low-temperature geothermal resources using Organic Rankine Cycle (ORC) technology.
- The Garrison Dam on the Missouri River, with a capacity of 583 megawatts, is North Dakota's fifth largest plant in electricity generation capacity.

Photo by Sgt. Brett Miller, North Dakota National Guard Visual Information

TRANSMISSION

The development of new transmission in North Dakota continues as companies construct lines to support new load growth as well as to connect new generation to the electric grid. Studies to identify impacts of new load on existing transmission systems and identify new lines needed for the future continue at individual companies and at regional transmission planning entities.

Highlights include:

- North Dakota Transmission Authority conducted a study of the impact of oil and gas development in the Williston Basin on electric load growth and transmission infrastructure.
- Basin Electric Power Cooperative, Inc. received approval from the North Dakota Public Service Commission for their 200-mile 345 kV line from the Antelope Valley Station to a substation located near Tioga. Construction will begin in Fall 2014 once federal approvals are received. This new line will help meet increasing regional electric demand and improve the reliability of the existing system, strengthening the electric infrastructure throughout the region.
- Basin Electric Power Cooperative and the Western Area Power Administration are moving forward with plans to join the Southwest Power Pool (SPP) Regional Transmission Organization. Final approvals will be sought in 2014 and, if successful, the two organizations will begin actual operations with SPP in 2015.
- Minnkota Power Cooperative is constructing a 345-kV transmission line that will stretch 250 miles from Center to Grand Forks, to be completed by August 2014.
- CapX2020 is a group of 11 Midwest-based utilities constructing more than 700 miles of new 345 kV transmission lines in the upper Midwest. One of the proposed routes is a 210-mile line that starts west of Fargo and stretches east to St. Cloud, Minnesota. The line is expected to be in service in 2015 and will support growing regional power demand and improve access to renewable energy.
- Otter Tail Power Company and Montana-Dakota Utilities Co. have jointly proposed the Big Stone South to Ellendale (BSSE) Transmission Line, a 345-kV line from Ellendale to a substation near Big Stone City, South Dakota. The project, which will be approximately 150 to 170 miles in length, is anticipated to cost between $270 and $390 million and will be in service in 2019.
- ALLETE and its subsidiary ALLETE Clean Energy have proposed an energy corridor with a backbone following an existing 465-mile path that contains a direct current transmission line running between Center and Duluth, Minnesota The energy corridor would expand a pathway along strategic portions of the existing right of way to minimize land use and optimize energy delivery infrastructure development within North Dakota. It is envisioned that various lengths of the corridor would be used for movement of natural gas, wastewater, petroleum and other products.
- Transmission costs vary depending on voltage, terrain type, conductors, length, right-of-way costs and many other factors. Many sources around the country report that average transmission costs for a new 345 kV line can be between $1 and $2 million per mile, depending on design and environmental conditions.

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WIND

Over the last few years, many of the region's utilities completed construction of wind facilities in order to comply with renewable portfolio standards in states surrounding North Dakota, meet internal policies related to diverse energy portfolio standards, secure a fixed price energy source, or to meet other business goals. Since 2008, the wind industry in North Dakota has found itself in a state of transition. Driven by a number of factors, including the economic slowdown caused by the 2008 recession and the resulting decrease in demand for electricity, prices for electric power have fallen significantly and regional congestion on the transmission system has impacted the construction of new wind facilities. In addition to these industry challenges, the uncertain future of Production Tax Credit (PTC), which Congress has yet to extend beyond December 2013, lingers as well. Yet, in spite of these issues, the capacity of the wind industry grew during the last year, but at a much lower rate than in recent years.

Despite the various challenges, wind energy prices have decreased significantly over the past seven years. Efficiencies in technology and market pressures have driven wind energy prices down over 50 percent to meet market demands.

Highlights include:

- Since 2012, the North Dakota Public Service Commission has approved wind projects with total nameplate capacity of over 700 MW. If these approved projects are constructed, the total investment associated with the projects is estimated at $1.33 billion.
- More than 990 wind turbines are operating in 26 North Dakota counties.

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- There are currently 700 megawatts of wind under construction in 2014.
- North Dakota ranked twelfth in the nation in wind capacity at the end of 2013, with 1,672 megawatts of wind in service.
- In the last two years, installed wind capacity in the state grew by only 104 megawatts, compared to 250 MW in the prior two-year period.

Demand for wind is anticipated to be strong with wind energy being a scalable, cost- effective, emission-free renewable resource in the region. Recent wind energy prices have made wind more attractive to many utilities, regulators and end users. There is also federal regulatory pressure moving the energy generation industry towards cleaner, renewable resources like wind energy.

The Midcontinent Independent System Operator, Inc. (MISO) is responsible for operation of the transmission grid across all or parts of 15 states, (including portions of North Dakota) and the Canadian province of Manitoba. The upgraded MISO transmission system has improved reliability and allows for additional wind energy to be connected to the grid. The expansion of the grid will allow for additional amounts of new wind energy on the regional transmission system.

North Dakota is well-positioned to develop additional wind energy and become a larger exporter of wind energy.

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